steep-skirted low-pass filter

025

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When considering the design of a filter, one is inclined to think of a combination of inductors, resistors, and capacitors, perhaps in association with an active element. The filter in the diagram shows that a different approach is perfectly feasible.

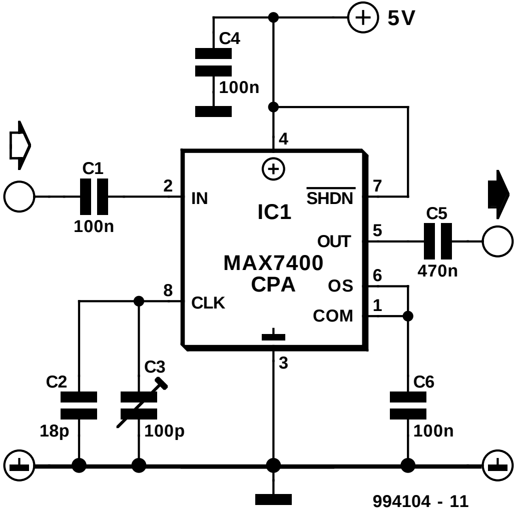
The filter is based on a Type MAX7400CPA from Maxim. This IC, in conjunction with six capacitors, forms an elliptic, eighth order low-pass filter. It operates from a single +5 V supply from which it draws a current of only 2 mA.

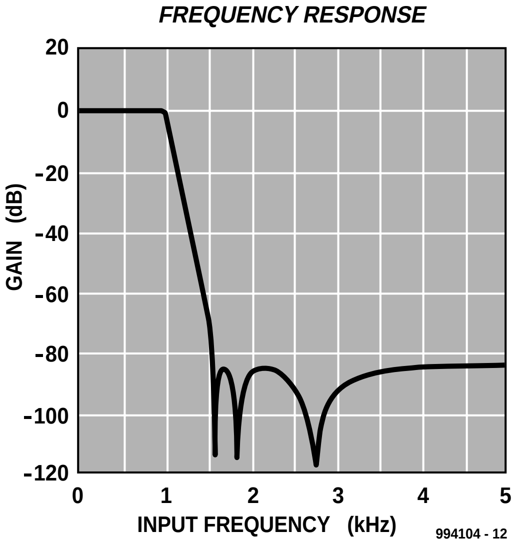
The cut-off frequency may be set between 1 kHz and 10 kHz and depends solely on the clock frequency used. The obtainable attenuation is, of course, of paramount importance. According to the manufacturers' data sheet this is 82 dB: the frequency response diagram confirms this specification.

The IC may be provided with a clock signal in two different ways. The circuit as shown uses the internal oscillator, whose operating frequency may be adjusted, and cut-off frequency adapted, with trimmer C_3. With component values as specified, the cut-off frequency may be set between 3 kHz and 10 kHz.

If it is necessary for the cut-off frequency to be set accurately, the IC may be provided with a stabilized clock signal via pin 8. The cut-off frequency is then equal to 1/00 of the clock frequency.

[994104]


5V
C4
100n
4
C1
100n
2
IN
IC1
MAX7400
CPA
SHDN
7
OUT
5
C5
470n
OS
6
COM
1
8
CLK
3
C2
18p
C3
100p
C6
100n
994104 - 11


FREQUENCY RESPONSE
20
0
-20
-40
-60
-80
-100
-120
GAIN (dB)
0
1
2
3
4
5
INPUT FREQUENCY (kHz)
994104 - 12